

What is claimed is:

1. A method for purifying sucralose from a crude sucralose solution comprising the steps of:
 - (a) subjecting a feedstock comprising said crude sucralose solution to a non-crystallization purification step to yield an increased purity sucralose solution;
 - (b) performing a crystallization procedure on said increased purity sucralose solution to obtain crystalline sucralose and a mother liquor;
 - (c) recycling at least a portion of said mother liquor to said feedstock of step (a); and
 - (d) performing at least three additional sequential crystallization procedures on said crystalline sucralose.
2. The method of claim 1, wherein said subjecting step comprises a non-crystallization purification procedure selected from the group consisting of liquid-liquid extraction, extractive precipitation, chromatography, precipitation followed by solvent washing, and derivative formation followed by extraction or distillation.
3. The method of claim 1, wherein said subjecting step comprises a non-crystallization purification procedure selected from the group consisting of a batch operation and a continuous operation.
4. The method of claim 1, wherein said subjecting step comprises a liquid-liquid extraction with ethyl acetate and water.
5. The method of claim 1, wherein at least a portion of said mother liquor from at least one of said additional crystallization procedures of step (d) is incorporated into a feed solution of one or more earlier stage crystallization procedures.
6. The method of claim 1, wherein at said mother liquor of step (b) or said at least a portion of said mother liquor of step (c) is subjected to an extraction operation prior to said recycling step.
7. The method of claim 1, wherein said subjecting step comprises chromatographic purification.
8. The method of claim 1, wherein said crystallization procedure is performed three times.
9. The method of claim 1, wherein said crystallization procedure is performed four times.

10. The method of claim 1, wherein said crystallization procedure is performed five times.
11. The method of claim 1, wherein said crystallization procedure is performed more than five times.
12. A method of purifying sucralose from a crude sucralose solution comprising the steps of:
 - (a) performing a crystallization procedure on said crude sucralose solution to obtain crystalline sucralose and a first mother liquor;
 - (b) dissolving said crystalline sucralose to obtain a sucralose solution and performing a crystallization procedure on the sucralose solution to obtain a more pure crystalline sucralose and an additional mother liquor;
 - (c) performing step (b) at least two additional times; and
 - (d) recycling said mother liquor obtained from one or more of said crystallization procedures into one or more of said sucralose solutions utilized in the earlier crystallization procedures.
13. A method of purifying sucralose from a crude sucralose solution comprising the steps of:
 - (a) subjecting a feedstock comprising said crude sucralose solution to a non-crystallization purification step to yield an increased purity sucralose solution;
 - (b) performing a crystallization procedure on said increased purity sucralose solution to obtain crystalline sucralose and a first mother liquor;
 - (c) dissolving said crystalline sucralose to obtain a sucralose solution and performing a crystallization procedure on the sucralose solution to obtain a more pure crystalline sucralose and a second mother liquor; and
 - (d) repeating step (c) at least two additional times to obtain a further purified sucralose and at least one additional mother liquor.
14. The method of claim 13, wherein said dissolving step is repeated three times.
15. The method of claim 13, wherein said dissolving step is repeated four times.
16. The method of claim 13, wherein said dissolving step is repeated five times.
17. The method of claim 13, wherein said dissolving step is repeated more than five times.
18. The method of claim 13, wherein one or more of said mother liquors are added to said feedstock of said subjecting step.

28. The method of claim 22, wherein said crystallization of the 6-O-acyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose is performed more than five times.
29. A method of obtaining sucralose from a feed mixture comprising 6-O-acyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose, other chlorinated sucrose byproducts, and optionally other blocked or partially blocked chlorinated sucrose byproducts comprising the steps of:
 - (a) performing a non-crystallization extraction step on said feed mixture to obtain an increased purity sucralose precursor stream;
 - (b) converting said 6-O-acyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose in said increased purity sucralose precursor stream to sucralose;
 - (c) crystallizing said sucralose to obtain a crystalline sucralose and a mother liquor; and
 - (d) performing at least three additional sequential crystallizations of said crystalline sucralose to obtain a substantially pure sucralose and additional mother liquor.
30. The method of claim 29, further comprising the step of crystallizing 6-O-acyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose from the increased purity sucralose precursor stream of step (a) prior to performing step (b).
31. The method of claim 29, wherein said crystallizing step is performed three times.
32. The method of claim 29, wherein said crystallizing step is performed four times.
33. The method of claim 29, wherein said crystallizing step is performed five times.
34. The method of claim 29, wherein said crystallizing step is performed more than five times.
35. A method for purifying sucralose from a crude sucralose solution comprising the steps of:
 - (a) subjecting a feedstock comprising said crude sucralose solution to a non-crystallization purification step to yield an increased purity sucralose solution;
 - (b) performing a crystallization procedure on said increased purity sucralose solution to obtain crystalline sucralose and a mother liquor;
 - (c) recycling at least a portion of said mother liquor to said feedstock utilized in step (a); and
 - (d) performing at least three more sequential crystallization procedures on said crystalline sucralose to yield a final crystalline sucralose composition wherein the level of other chlorinated sugars is less than 0.2% of the composition by weight.

19. The method of claim 13, wherein said mother liquor from any of said crystallization procedures is recycled to one or more earlier stage crystallization procedures.
20. The method of claim 13, wherein one or more steps are performed as batch operations.
21. The method of claim 13, wherein one or more steps are performed as continuous operations.
22. A method of obtaining sucralose from a feed mixture comprising 6-O-acetyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose, other chlorinated sucrose byproducts, and optionally blocked or partially blocked chlorinated sucrose byproducts comprising the steps of:
 - (a) performing a non-crystallization extraction step on said feed mixture to obtain an increased purity 6-O-acetyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose composition;
 - (b) performing a crystallization procedure on said increased purity 6-O-acetyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose composition to obtain 6-O-acetyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose and a mother liquor;
 - (c) performing at least three additional sequential crystallizations of the 6-O-acetyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose to obtain a substantially pure 6-O-acetyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose and additional mother liquor; and
 - (d) converting said substantially pure 6-O-acetyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose to substantially pure sucralose.
23. The method of claim 22, wherein one or more of said mother liquors of steps (b) or (c) are recycled into one or more of said performing non-crystalline extraction steps and said performing crystallization steps.
24. The method of claim 22, wherein said performing a non-crystalline extraction step comprises a non-crystallization purification procedure selected from the group consisting of liquid-liquid extraction, chromatography, and precipitation followed by solvent washing.
25. The method of claim 22, wherein said crystallization of the 6-O-acetyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose is performed three times.
26. The method of claim 22, wherein said crystallization of the 6-O-acetyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose is performed four times.
27. The method of claim 22, wherein said crystallization of the 6-O-acetyl-4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose is performed five times.

36. The method of claim 35, wherein said crystallization procedure is performed three times.
37. The method of claim 35, wherein said crystallization procedure is performed four times.
38. The method of claim 35, wherein said crystallization procedure is performed five times.
39. The method of claim 35, wherein said crystallization procedure is performed more than five times.
40. A purified sucralose composition obtained by the method of claim 1.
41. A purified sucralose composition obtained by the method of claim 12.
42. A purified sucralose composition obtained by the method of claim 13.
43. A purified sucralose composition obtained by the method of claim 22.
44. A purified sucralose composition obtained by the method of claim 29.
45. A purified sucralose composition obtained by the method of claim 35.
46. A sweetener composition comprising purified sucralose, wherein the ratio of said purified sucralose to impurities is greater than about 500:1.
47. The composition of claim 46, wherein the ratio of said purified sucralose to impurities is greater than about 750:1.
48. The composition of claim 47, wherein the ratio of said purified sucralose to impurities is greater than about 1000:1.
49. The composition of claim 46, wherein said impurities comprises one or more impurities selected from the group consisting of water, 4,6'-dichlorogalactosucrose, 4,1'-dichlorogalactosucrose, 1',6'-dichlorosucrose, 3',6'-anhydro-4,1-dichlorogalactosucrose, 4,1',6'-trichlorogalactosucrose-6-acetate, 6,1',6'-trichlorosucrose, and other chlorinated carbohydrates.
50. The composition of claim 46 wherein said purified sucralose is in an aqueous solution.
51. The composition of claim 50 wherein said solution additionally contains preservatives.
52. The composition of claim 51 wherein said preservatives are sorbic acid, benzoic acid, or dihydroxybenzoic acid, or the salts thereof that are suitable for human ingestion.

53. A product comprising a sucralose composition obtained by the method of claim 1, wherein said product is selected from the group consisting of beverages, combination sweeteners, consumer products, and sweetener products.
54. A product comprising a sucralose composition obtained by the method of claim 12, wherein said product is selected from the group consisting of beverages, combination sweeteners, consumer products, and sweetener products.
55. A product comprising a sucralose composition obtained by the method of claim 13, wherein said product is selected from the group consisting of beverages, combination sweeteners, consumer products, and sweetener products.
56. A product comprising a sucralose composition obtained by the method of claim 22, wherein said product is selected from the group consisting of beverages, combination sweeteners, consumer products, and sweetener products.
57. A product comprising a sucralose composition obtained by the method of claim 29, wherein said product is selected from the group consisting of beverages, combination sweeteners, consumer products, and sweetener products.
58. A product comprising a sucralose composition obtained by the method of claim 35, wherein said product is selected from the group consisting of beverages, combination sweeteners, consumer products, and sweetener products.
59. A purified sucralose composition comprising less than 0.01 percent impurities.
60. The composition of claim 59, wherein one or more of said impurities is selected from a group consisting of halogenated sugar derivatives, any acylated sucralose, salt, or carbohydrate.
61. The composition of claim 60, wherein said halogenated sugar derivatives comprise dichlorosucrose acetate, 6,1',6'-trichlorosucrose, 4,6,6'-trichlorosucrose, 4,1',4',6'-tetrachlorogalactotagatose, 4,1',6'-trichlorogalactosucrose-6-acetate, and 4,6,1',6'-tetrachlorogalactosucrose, 4,1'-dichlorogalactosucrose, 3',6'-dichloroanhydrosucrose, 4,6'-dichlorogalactosucrose, 1',6'-dichlorosucrose, 6,6'-dichlorosucrose, and 4,1',6'-trichlorosucrose.
62. A method for purifying sucralose from a crude sucralose solution comprising the steps of:
- (a) subjecting a feedstock comprising said crude sucralose solution to a non-crystallization purification step to yield an increased purity sucralose solution; and

(b) performing at least three crystallization procedures on said increased purity sucralose solution to obtain crystalline sucralose and a mother liquor.

63. The method of claim 62, wherein said subjecting step comprises a non-crystallization purification procedure selected from the group consisting of liquid-liquid extraction, extractive precipitation, chromatography, precipitation followed by solvent washing, and derivative formation followed by extraction or distillation.

64. The method of claim 62, wherein said subjecting step comprises a non-crystallization purification procedure selected from the group consisting of a batch operation and a continuous operation.

65. The method of claim 62, wherein said subjecting step comprises a liquid-liquid extraction with ethyl acetate and water.

66. The method of claim 62, wherein said subjecting step comprises chromatographic purification.

67. The method of claim 62, wherein said crystallization procedure is performed three times.

68. The method of claim 62, wherein said crystallization procedure is performed four times.

69. The method of claim 62, wherein said crystallization procedure is performed five times.

70. The method of claim 62, wherein said crystallization procedure is performed more than five times.

71. A sweetener composition comprising purified sucralose, wherein the ratio of said purified sucralose to chlorinated impurities is greater than about 500:1.

72. The composition of claim 71, wherein the ratio of said purified sucralose to chlorinated impurities is greater than about 750:1.

73. The composition of claim 72, wherein the ratio of said purified sucralose to chlorinated impurities is greater than about 1000:1.

74. The composition of claim 71, wherein said chlorinated impurities comprises one or more impurities selected from the group consisting of 4,6'-dichlorogalactosucrose, 4,1'-dichlorogalactosucrose, 1',6'-dichlorosucrose, 3',6'-anhydro-4,1-dichlorogalactosucrose, 4,1',6'-trichlorogalactosucrose-6-acetate, and 6,1',6'-trichlorosucrose.

75. A method for enhancing the palatability of a consumer product comprising the step of adding purified sucralose to said consumer product.

76. The method of claim 75, wherein said purified sucralose is 99.9% pure.
77. The method of claim 75, wherein said sucralose is present within said consumer product at a level of about 3 parts per million to about 0.1%.
78. The method of claim 77, wherein said level is about 5 parts per million to about 1000 parts per million.
79. The method of claim 77, wherein said level is about 10 parts per million to about 500 parts per million.
80. A method for enhancing the palatability of a beverage comprising the step of adding purified sucralose to said beverage.
81. The method of claim 80, wherein said purified sucralose is 99.9% pure.
82. The method of claim 80, wherein said sucralose is present within said beverage at a level of about 3 parts per million to about 0.1%.
83. The method of claim 82, wherein said level is about 5 parts per million to about 1000 parts per million.
84. The method of claim 82, wherein said level is about 10 parts per million to about 500 parts per million.
85. A method for enhancing the palatability of a consumer product comprising the step of adding purified sucralose to said consumer product wherein the level of said sucralose in a resulting consumer product does not modify the sweetness of said consumer product.
86. A method for enhancing the palatability of a beverage comprising the step of adding purified sucralose to said beverage wherein the level of said sucralose in a resulting beverage does not modify the sweetness of said resulting beverage.